

Photo #11. Core-6th floor Carbonation of the matrix appears as wide rims around the aggregates. 40X, XP, 1/2" depth

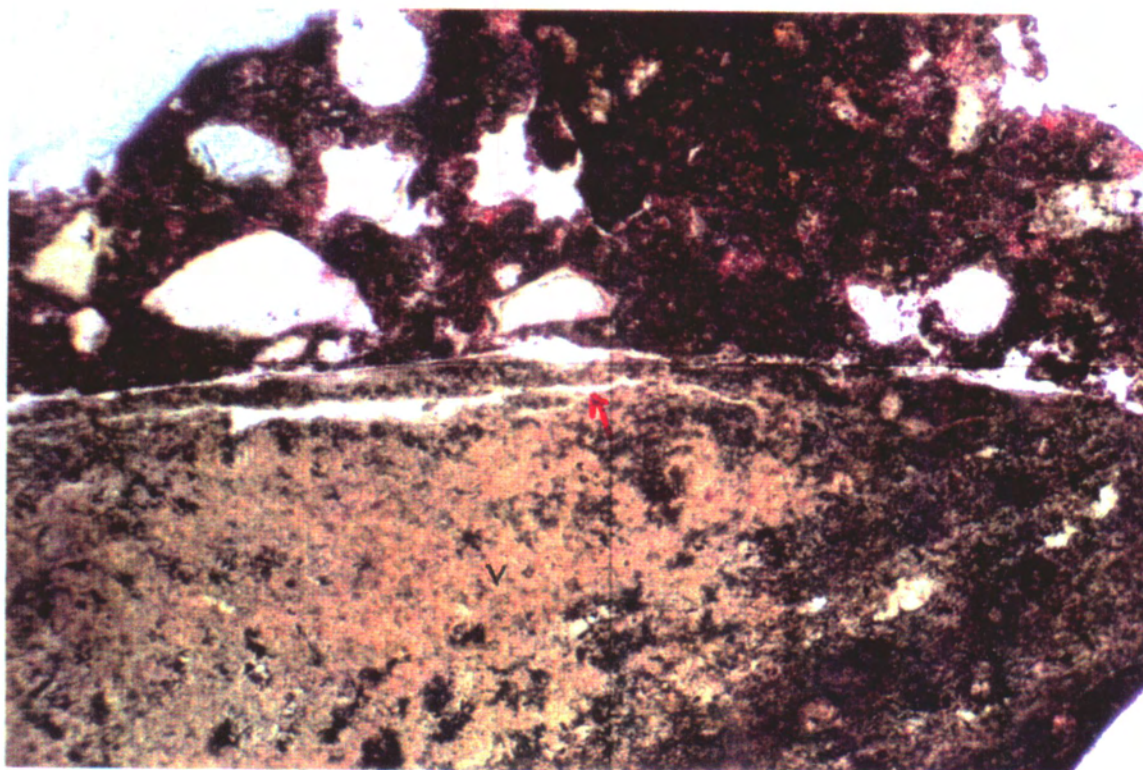


Photo #12. Core-6th floor Extensive cracking between a volcanic fragment (bottom) and matrix (top). the matrix is dyed red by carbonate indicator dye. 40X, PL, 1 1/4" depth

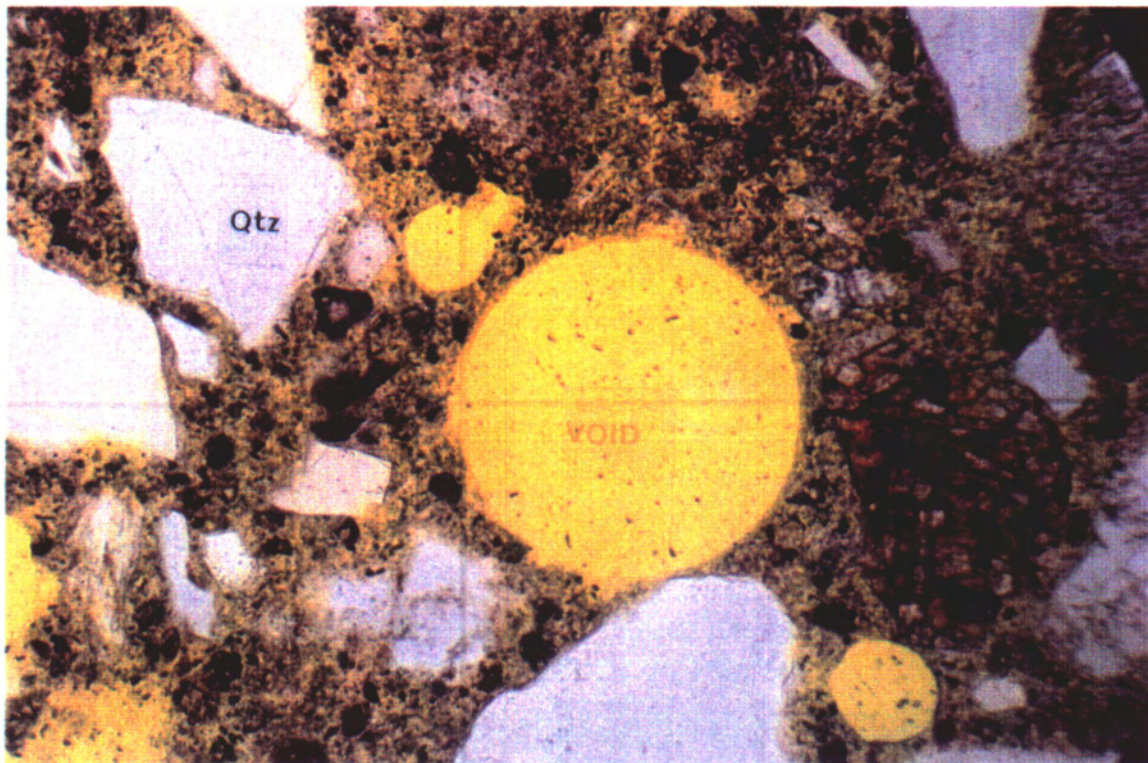


Photo #13. Core-6th floor Highly carbonated matrix. Air voids are highlighted by yellow fluorescent epoxy. 40X, PL, 1 5/8" depth

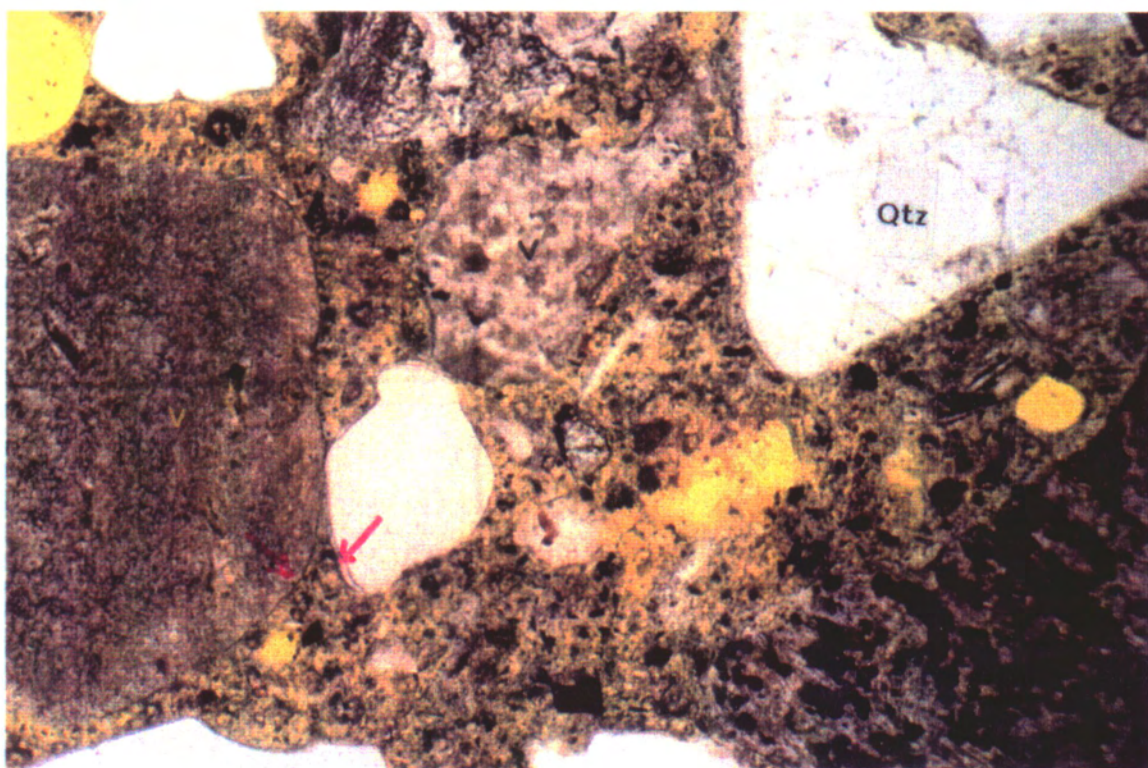
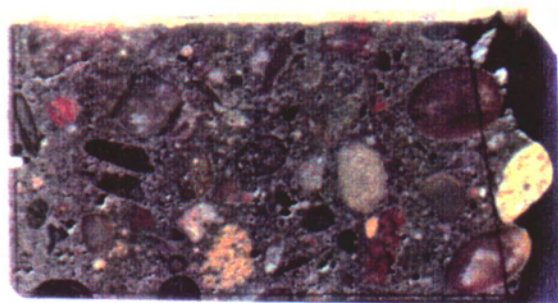
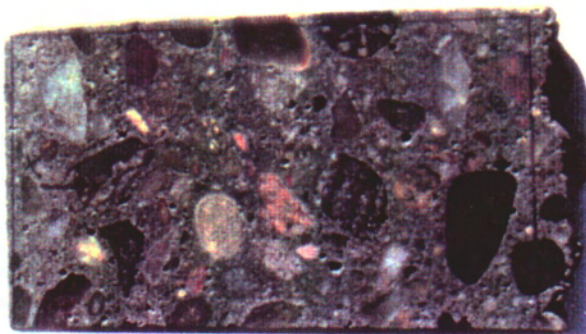


Photo #14. Core-6th floor Microcracks around aggregate (arrows). Highly carbonated matrix. 40X, PL, 2" depth

AIR VOID



NORMAL LIGHT



NORMAL LIGHT

GARCO TESTING LABORATORIES

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Phone 266-4498

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September 28, 1993

Frank Strickland
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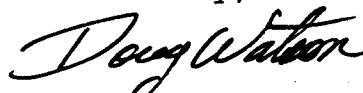
Project: Albuquerque Federal Building

ASTM C-457 Microscopical Determination of Air Void Content of Hardened Concrete

Lab #60891

Length	=	101.47 (in)
Air Content	=	4.84 Total
Entrained Air	=	3.44%
Entrapped Air	=	1.40%
% Aggregate	=	72.64%
% Paste	=	27.36
Void/Inch	=	2.76
Cord Intercept	=	0.018 (in)
Specific Surface	=	222.2 (sq in/cu in)
Spacing Factor	=	0.025 (in)

Sincerely,



Doug Watson
General Manager

dw/ph

APPENDIX A-2

STRUCTURAL SUPPORT DATA

**CONC. TEST RESULTS - PETROGRAPHIC EXAMINATION
REPORT BY CONSTRUCTION TECHNOLOGY LABS**

Report to
REAVELY ENGINEERS AND ASSOCIATES

NOVEMBER 1993

CTL

Construction Technology Laboratories, Inc.

5420 Old Orchard Road, Skokie, Illinois 60077-1030



5420 Old Orchard Road, Skokie, Illinois 60077-1030

Phone: 708/965-7500 Fax: 708/965-6541

November 29, 1993

Mr. Jeff Miller
Reavely Engineers and Associates
1515 South 1100 East
Salt Lake City, UT 84105

Dear Mr. Miller:

Enclosed are the results of petrographic and physical testing performed on samples you submitted.

Test results indicate poor quality concrete primarily the result of high water-to-cement ratio. The measured compressive strength (less than 2200 psi for each core tested) is indicative of the high water-to-cement ratio. Modulus of elasticity is low as would be anticipated based on compressive strength. The deviation from linearity in the stress-strain curves is likely the result of pre-existing microcracking. While many of the aggregates observed in the cores are typical of those susceptible to alkali-silica reaction, there is little to no evidence of reaction products. This may be due to a lack of moisture in the concrete.

I trust you will find this information helpful for your evaluation. Please call if you have any questions.

Your samples will be retained until February 1994 when they will be discarded, unless we hear otherwise from you.

Very truly yours,

Ronald D. Sturm
Petrographer
Petrographic Services

RDS
153235

Enclosure





5420 Old Orchard Road, Skokie, Illinois 60077-1030
Phone: 708/965-7500 Fax: 708/965-6541

PETROGRAPHIC SERVICES REPORT

CTL Project No.: 153235

Date: November 29, 1993

Re: Petrographic Examination of Concrete Cores, Albuquerque Federal Building,
Albuquerque, New Mexico

Seven concrete cores were received on November 2, 1993 from Mr. Jeff Miller, Reavely Engineers & Associates, Salt Lake City, Utah. Reportedly, the cores were drilled from four elevated floor slabs in the Albuquerque Federal Building, 517 Gold Avenue, Albuquerque, New Mexico. The location/designation of the cores, as marked on each core, are listed as follows:

3rd Floor East 2

4th Floor West 1, 4th Floor West 2

7th Floor West 1, 7th Floor West 2

8th Floor East 1, 8th Floor East 2

Petrographic examination of the 3rd Floor East 2, 4th Floor West 2, 7th Floor West 2, and 8th Floor East 2 cores was requested to evaluation the condition and general characteristics of the concrete and to determine if expansive alkali-silica reaction has occurred in the concrete.

FINDINGS AND CONCLUSIONS

Petrographic examination of the four cores reveals each consists of similar concrete. Concrete characteristics and properties are described as follows:

1. Each core consists of similar, evenly-graded, mainly siliceous coarse and fine aggregate dispersed in a paste of portland cement. Fly ash or other mineral pozzolans are not observed in the cement paste. Aggregate distribution is uniform to slightly nonuniform.



2. The water-cement ratio is interpreted at 0.65 or higher in each of the examined cores. The interpretation is based on observed paste properties, including paste color, hardness, and luster, paste-aggregate bond, and estimated percentages of calcium hydroxide crystals and unhydrated portland cement clinker particles (UPC's) in the paste.
3. Air content is estimated at 1 to 2% in each core. The voids observed in the cement paste are generally small and spherical, typical of entrained air voids.
4. The top end of each core is covered by a thin multi-layered coating. Thickness of the coating ranges up to 0.3 mm (0.012 in.) in the 4th floor core; slightly less in the other cores.

The cores were each received with no visible major cracks or evidence of alkali-silica reaction. Minor vertical hairline cracks and microcracks, likely caused by drying shrinkage in the concrete, are observed in the top portion of each core. A few randomly oriented microcracks are observed at greater depth in the concrete. The cracks/microcracks pass mainly around aggregate particles and do not penetrate the coating material at the top end of each core. Some penetration of the coating material into the upper 0.1 to 0.2 in. of vertical cracks is observed in the 3rd Floor and 8th Floor cores, suggesting the coating was placed after some cracks had formed in the slabs.

Compressive strength was determined on all of the nominal 2-3/4-in. diameter cores. Modulus of elasticity was determined on two of the 2-3/4-in. cores prior to determination of compressive strength. Test results are attached.

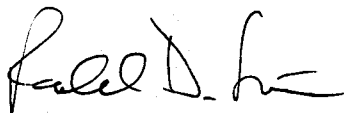
METHODS OF TEST

Petrographic examination of the concrete cores was performed in accordance with ASTM C 856-83 (reapproved 1988), "Standard Practice for Petrographic Examination of Hardened Concrete." Each core was cut longitudinally, and one of the resulting halves of each was lapped and examined using a stereomicroscope at magnifications up to 45X. Surfaces of freshly fractured concrete were also studied with the stereomicroscope. Small rectangular blocks were cut from the top 1.5 in. of each core, placed on a glass microscope slide with

CTL

epoxy resin, and reduced to a thickness of approximately 20 micrometers (0.0008 in.).

The thin sections were examined using a polarized-light microscope at magnifications up to 400X, to determine aggregate and paste mineralogy and microstructure.



Ronald D. Sturm
Petrographer
Petrographic Services

RDS/cjd

153235

Attachments